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MONDAY, FEBRUARY 28TH, 1853.

HUMPHREY LLOYD, D.D., PRESIDENT, in the Chair.

THE Secretary announced the following donations:—

A Treatise on Syphilitic Diseases, by J. C. Egan, M.D., M.R.I.A.; presented by the author. A very rare form of ancient stone battle-axe, found in the county of Galway; presented by A. B. Cane, Esq., M.R.I.A.

The following Answer to the Address to the Lord Lieutenant, adopted at the last Meeting, was read, and ordered to be printed in the Proceedings:—

"GENTLEMEN,—I accept with pleasure your congratulations on my arrival in this country as the Representative of our Most Gracious Sovereign.

"The study of ancient records, and of the remaining documents of antiquity, is a useful and important, as well as an interesting, one.

"Fully to understand the present, it is, indeed, necessary to have some insight into the past. If this be true when said generally, and of any country, it is especially true when said of Ireland, on the character of whose people the past has left so many traces.

"As the official Visitor of your Academy, I shall willingly co-operate with you in carrying into full effect the intentions of its founder, and in thus promoting Science, Polite Literature, and the study of Antiquities in Ireland."

Dr. Allman read a note on the development of the ferment-cells, and on some other vital phenomena of fermentation.

In this communication the author first brought before the notice of the Academy the occurrence of a certain peculiar organism which is developed in company with the ferment-cells in fluids undergoing the alcoholic fermentation, and whose presence in the alcoholic fermentation of wort appears to be as universal a phenomenon as that of the ferment-cells themselves.

It consists of rigid filaments, apparently destitute of spontaneous motion, except a slight vibration, manifestly molecular; these filaments are at first straight, but afterwards become, for the most part, abruptly bent at an obtuse angle, generally at about a third of their length. They correspond nearly with the genus *Bacterium*, as defined by Ehrenberg, and though Ehrenberg's definition may, perhaps, not strictly apply to them, it would seem more advisable to place them in the genus Bacterium than to construct for them a new one. The bodies in question possess considerable resemblance to the *Bacterium termo* of Dujardin: from this animalcule, however, they differ in their greater length in proportion to their breadth; in their entirely uniform diameter; in the angular bend presented by the full-grown filament; in the total absence of all trace of transverse divisions in the mature individuals; and in being entirely deprived of locomotion. The peculiar circumstances under which the Bacterium of the alcoholic fermentation is developed, suggested the specific name of *cerevisiæ*, under which the author proposed to designate it.

Bacterium cerevisiæ is one of the first distinct organisms that shows itself in the fermentable fluid; it appears anterior to the ferment-cell, and precedes all sensible fermentation. It is itself, however, preceded by excessively minute, spherical corpuscles, and its formation was distinctly traced to the union in a rectilineal series of several of these corpuscles, originally quite distinct from one another. Ehrenberg explains the formation of the chain-like filaments of the Vibrionidæ by the supposition of the imperfect self-division of an original monadic element. The origin of Bacterium cerevisiæ, however, is certainly such as is here described, and this organism is, therefore, truly compound. The excessive minuteness of the monadic element of the Bacterium renders it impossible to form a satisfactory conclusion as to its real structure; the microscope shows nothing but a simple granule, presenting active molecular motion. It is only during the very early age of Bacterium cerevisiæ that the composition of the filament is apparent, a little later all trace of transverse division disappears, and the filament appears perfectly smooth and homogeneous.

The author has examined many examples of distillers' wort during the progress of fermentation, both experimentally, on a small scale, and in large masses in the fermenting-backs, and he has universally observed the presence of the Bacterium; in instances where, for the sake of experiment, fermentation was prevented, the ferment-cells were never developed, and the Bacterium very imperfectly.

The author then proceeded to detail the results of some careful observations he had made on the progress of development of the ferment-cells and Bacterium filaments during the alcoholic fermentation of wort.

A specimen of distillers' wort, prepared from mixed grain, was introduced into a flask, and set to ferment at a temperature of about 90°, without the addition of yeast. It was then carefully examined by the microscope, at intervals of twelve hours, and the results noted. The fluid, when first set to ferment, contained some untransformed starch granules suspended in it, with amorphous granular matter and a few minute oil-globules. No trace of ferment-cells or of Bacterium could be detected by the most careful microscopical examination.

After twelve hours.—No appearance of fermentation. The microscope reveals numerous filaments of Bacterium, but no ferment-cells are yet visible.

After twenty-four hours.—A few small air-bubbles are collected round the edge of the fluid, but otherwise there is no decided appearance of fermentation.

Under the microscope a few very small cells may be seen, some single, and some in groups of two. Filaments of Bacterium numerous.

After thirty-six hours.—Fermentation decidedly established, a thin layer of froth on the surface. Ferment-cells much more numerous, and, for the most part, larger; some solitary, others in groups of two or three. Filaments of Bacterium as on preceding observation.

After forty-eight hours.—Fermentation very active, a copious frothy head, strong vinous odour.

Ferment-cells have much increased, and may be seen in various stages of germination; some are solitary, others form groups of two, three, four, or, occasionally, five; and some of the groups have begun to exhibit a disposition to branch; some of the cells have considerably increased in size. *Bacterium* filaments abundant.

After sixty hours.—Fermentation very active; a copious dense yeast has been deposited at the bottom of the flask; the fluid continues to exhale a strong vinous odour.

Under the microscope the ferment-cells are seen to have still multiplied, and branched groups, of from three to six cells, are frequent. There is an evident general increase in the size of the cells. Bacterium filaments abundant.

After seventy-two hours.—Fermentation still very active, but the fluid presents no change of importance since last observation.

After eighty-four hours.—Fermentation has greatly subsided. Cells still numerous throughout the fluid, but much more so at the bottom, where they have collected into a copious yeast. The cells of this yeast are mostly solitary, and larger than the majority of the floating cells; a great number of the latter continue united in simple linear or branched groups. Bacterium filaments are very abundant all through the fluid.

A few hours after this the fermentation appeared to have entirely ceased. The ferment-cells had almost all subsided to the bottom. The Bacterium filaments continued abundant, suspended at all depths through the fluid.

The ferment-cells, when mature, are nearly spherical, and present an eccentric spherical cavity; this cavity, however, is not the true cell-cavity, but a mere vacuole in the protoplasmic contents. Its size is very various; it is sometimes barely visible under the highest powers, while, in other instances, it occupies nearly the whole of the cell. By the action of iodine the protoplasm is turned dark-brown, and the cell-membrane is then rendered apparent. There is no distinct indication of a nucleus; and authors who have described a manifest nucleus have evidently mistaken for this body the vacuole, already described, in the protoplasm. If a nucleus exist, it is probably concealed in the thick opaque protoplasm. In some instances the contents of the cell appeared broken down into a multitude of detached granules; the cell-wall was then very visible without the aid of iodine; this condition was probably confined to dead cells.

In an example of "spent wash," the residuum which remains after the distillation of the fermented wort, the microscope showed that the solid matter was almost exclusively composed of ferment-cells and Bacterium filaments; the cells retained their spherical figure, but their contents presented the granular condition just described. The filaments appeared unaltered.

Dr. Apjohn read a paper on the nature and relative proportion of the alkalies occurring in the granite of the vicinity of Dublin.

A paper was read at a recent meeting of the Academy, by Sir Robert Kane, which communicated the results of some analyses, made under his direction, of waters from Ticknock, on the slope of the Dublin mountains. From this communication it appeared, that these waters included a large amount of alkaline silicates, but that the proportion of potash present was very small compared to that of the soda, their relative quantities being very nearly represented by the numbers 1 and 13.